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**Vermont Department of Environmental Conservation**

Watershed Management Division  
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*Agency of Natural Resources*

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June 8, 2015

Laurie Adams, Assistant Director  
Department of Public Works  
City of Burlington  
P.O. Box 878  
Burlington, Vermont 05402-0878

**Subject:** Compliance Evaluation Inspection  
Burlington Main Wastewater Treatment Facility  
NPDES #VT0100153, Discharge Permit #3-1331

Dear Ms. Adams:

On June 9, 2015, I conducted a Compliance Evaluation Inspection (CEI) of the Burlington Main Wastewater Treatment Facility (WWTF) located at 53 Lavalley Lane in Burlington. CEIs are intended to verify compliance with discharge permits, self-monitoring requirements, and compliance schedules. CEIs are a relatively in-depth inspection of the WWTF, self-monitoring records and reports, and other required records. Chief Operator Tim Grover assisted with the inspection.

CEIs do not include sampling of the effluent for analysis. Although the final effluent was not analyzed, at the time of the CEI the effluent appeared slight cloudy without any apparent solids. It should be noted that significant rain storms occurred before and during the CEI, and the effluent flow was about 12 MGD which is close to the hydraulic capacity of the WWTF and which would account for the slightly cloudy appearance.

The overall inspection rating for the Burlington Main WWTF CEI for the period May 1, 2014 to April 30, 2015 is "Excellent" which is the highest rating in our five tier rating system.

### **Effluent Discharge Locations**

The Burlington Main consists of two treatment systems: the "secondary treatment process" and the "combined sewer overflow treatment process". Pages 2 and 3 (copy attached) from the Fact Sheet dated March 2005 describe the two treatment process. The sheet titled "Main WWTP Scenario 2 – High CSO Flow (13 to 88 MGD)" (copy attached) illustrates how the two treatment processes work together to treat influent flows of up to 88 MGD. Influent flows above 88 MGD do not receive treatment or disinfection.

The effluent discharge from the secondary treatment process is identified as "S/N 001" and that from the combined sewer overflow treatment process is identified as "S/N 002". The Discharge Permit includes two sets of discharge limitations and conditions – one is for S/N 001 and the other is for S/N 001 and S/N 002 combined.

### **Self-Monitoring Data Review**

A review of the self-monitoring reports (i.e. WR-43 forms) received for the Burlington Main WWTF during the twelve months prior to the inspection (May 1, 2014 to April 30, 2015) for discharge locations S/N 001 revealed there was one violation. The *Escherichia coli* bacteria (*E. coli*) result for an effluent grab sample taken on August 26, 2014 was 96 colonies/100 ml which slightly exceeded the effluent limit of 77 colonies/100 ml. The cause of the

violation is unknown. At the time the grab sample was taken, the residual chlorine concentration was 0.29 mg/l which should have provided sufficient disinfection. The result of a follow-up E. coli grab sample taken the following day was 4 colonies/100 ml. There were no violations for discharge location S/N 001 and S/N 002 combined. This is an excellent compliance record.

During the 12 month inspection period, the average Total Phosphorous concentration was 0.44 mg/l compared to the permit limit of 0.8 mg/l. During the 2014 calendar year, a total of 4,792 pounds of Total Phosphorous were discharged, which is about 49% of the permitted limit of 9,682 pounds annually.

The average 5-day Biological Oxygen Demand (BOD<sub>5</sub>) and Total Suspended Solids (TSS) removal over the 12 month period averaged 96.5% and 98.2% respectively. These are excellent removal rates and indicate the WWTF's activated sludge treatment process is well operated.

### **Other Effluent Monitoring Requirements**

The Whole Effluent Toxicity (WET) Test (see Discharge Permit #3-1331 Sections I.A.1., I.A.3., and I.E.2) sample must be collected during the period June through August, and the test results must be submitted by October 15 of each year. The 2014 WET Test was conducted in August and Test Report was submitted on September 16, 2014. The Report states that the results were "Pass".

Condition I.E.3 requires annual monitoring for: Temperature, Dissolved Oxygen, Nitrate/Nitrite, Total Kjeldahl Nitrogen, and Oil & Grease, and Total Dissolved Solids. The Permit does not establish effluent limits for these parameters. Condition I.E.3 requires the samples "be representative of seasonal variation in the discharge" where seasonal variations are based on calendar quarters. A review of the annual constituents monitoring reports submitted since 2005 (when Permit #3-1331 became effective) indicates the Town has submitted the required annual constituents monitoring reports through 2014. The review also indicates the samples have been collected during the fall quarter four times while during the winter, spring and fall quarters are represented two times. The 2015 sample should be collected during the third/summer quarter.

### **Facility Tour and Inspection**

Most of the equipment and facilities at the Burlington Main WWTF were inspected including:

- The influent diversion structure, combined sewer overflow and screening facility including the gate valves, screens, dry weather wet well and pumps, wet weather wet well and pumps, the swirl separators, "foul sewer" (concentrated underflow from the swirl separator), and the odor control system;
- The Grit Building including aerated grit chamber, grit classifier, and grease removal system;
- Both primary clarifiers and the odor control system;
- 12 aeration tanks including the aeration blowers;
- Chemical and biological nutrient removal systems;
- Four secondary clarifiers;
- Disinfection contact tank;
- Disinfection systems including the dry weather sodium hypochlorite system and the wet weather sodium bromide and sodium hypochlorite system;
- The influent and effluent sampling locations;
- Swirl separator and effluent flow meters;
- Odor Control Systems; and
- Emergency generator.

The two sludge digesters and sludge dewatering facility/equipment were not inspected. All equipment and facilities were fully operational and in use, and the equipment and facilities inspected appear to be in good to excellent condition. At the time of the CEI, the aeration tanks were operating in "storm mode". Overall, the WWTF including buildings and grounds appear to be very well maintained.

The effluent flow from the secondary treatment process is measured via a rectangular weir located at the end of the disinfection contact tank. The water elevation behind the weir is measured by an ultrasonic meter. The ultrasonic meter is calibrated by placing a steel plate at a set distance below the meter. A Standard Operating Procedure documents how this meter is calibrated. I reviewed the SOP and found it is acceptable.

Flow leaving the swirl separator is measured by the height of water exiting through the overflow weir. Similar to the secondary treatment process effluent flow measurement, the water height is also measured by an ultrasonic meter, the meter is calibrated via a steel plate, and there is a SOP for calibrating this meter.

Influent composite samples are obtained just prior to Gate #7 which is immediately downstream of the dry weather bar screen. S/N 001 effluent composite samples are obtained just prior to the rectangular weir located at the end of the chlorine contact. Grab samples are taken just after the rectangular weir. Combined S/N 001 and S/N 002 effluent composite and grab samples are obtained in the outfall structure just after the point where the two effluents merge.

The influent and both effluent composite samplers were inspected. The refrigerated portion of the three samplers included a non-NIST-certified spirit thermometer. Federal regulations require that the composite samples be cooled to at least 6°C as they are being collected. During collection of composite samples, the temperature needs to be recorded at the beginning and end of the sampling period. The thermometers currently being used are adequate, however they need to be calibrated against a NIST traceable thermometer at least once per year.

### **Laboratory Tour and Inspection**

I conducted a quick tour and inspection of the laboratory. The laboratory was neat and clean appears to be adequate for the tests and analyses performed.

In terms of the analyses required to be reported monthly on the self-monitoring reports (i.e. WR-43s), Total Suspended Solids (TSS), Total Phosphorus, Settleable Solids, Total Ammonia, E. coli, Total Residual Chlorine (TRC), and pH are performed on-site. BOD<sub>5</sub> and the WET Test are done by outside laboratories.

In terms of the analyses required annually, temperature and Dissolved Oxygen are performed on-site. Total Kjeldahl Nitrogen, Oil & Grease, Total Dissolved Solids are analyzed by an outside laboratory. Nitrate & Nitrite are sometimes done on-site, sometime done by an outside laboratory.

The City has a contract with Q. C. Services Inc. (Harrison, ME) to service and calibrate the laboratory equipment and instruments annually. I observed a Q. C. Services Inc. sticker on the HACH DR 2800 Spectrophotometer and on the VWR Scientific incubator stating they were serviced on 6/10/2014 and that the next service is date 6/2015. Soon after the CEI, Q.C. Services was on-site to conduct the annual equipment servicing and calibration. The scale had an All-State Scale Co. (Somers, CT) sticker stating it was calibrated on 11/13/2014 and that the next service is due 11/2015.

The pH meter and probe appear to be in good to excellent condition. The pH probe is replaced at least annual, sometimes more frequently. I checked the three buffers used to calibrate the pH meter (pH 7.00, pH 10.00, and pH 7.00 with a different lot number). All were within their expiration dates.

A copy of the *Main WWTP Lab QC and Process Testing Manual* dated January 2008 is kept in the laboratory. I quickly reviewed the Daily Rounds Log which is completed on a daily basis and the TSS laboratory analysis bench sheet. Both documents appear to be well thought out and appropriate.

The Operators were in the process of completing the annual proficiency sample program.

### **WWTF Records and Documents Review**

Tim produced copies of:

- The current Burlington Main WWTF Discharge Permit #3-1331 (effective July 1, 2005).
- The Electric Power Failure Plan (EPFP). The EPFP is required by Condition I.H. of Discharge Permit# 3-1331 and needs to address the WWTF and any pump stations.
- The Operations, Management, and Emergency Response Plan (OM&ER Plan) that addresses the three Burlington WWTFs (including the Main WWTF), pump stations, and stream crossings and was approved by the Department of Environmental Conservation (DEC), Wastewater Management Division on August 20, 2009.
- The OM&ER Plan that addresses the Burlington Main WWTF collection system that was approved by the DEC Wastewater Management Division on July 6, 2010.

OM&ER plans are required by State Statute (10 VSA§1278). When the Burlington Main WWTF Discharge Permit is renewed, the Permit will require implementation of the OM&ER Plans and the inspection schedules in the OM&ER Plans will need to be documented.

A cursory review of the WWTF's records for the past three years was conducted, including the self-monitoring reports (i.e. Form WR-43), daily bench sheets, contract laboratory reports, flow charts, and effluent flow meter checks. The records appear to be complete and well organized. I compared the data provided on the self-monitoring reports for Outfall S/N 001 and combined outfalls S/N 001 and S/N 002 against the daily bench sheets and contract laboratory reports for August 2014 and found eight minor transcription errors. A revised WR-43 for August 2014 that corrects the errors has been submitted. It is recommended that a procedure to carefully check the values entered into the WR-43 forms prior to submittal be implemented.

### **Maintenance and Safety Programs**

The maintenance and safety programs were not reviewed per se. Overall, my impression is the maintenance and safety programs are appropriate and more than sufficient for this WWTF.

### **Chemical Storage**

All chemicals appear to be properly stored including ferric chloride, polymer, sodium bromide, sodium hydroxide, aluminum sulfate (alum), potassium permanganate, caustic soda, and a citrus-based product for odor control.

### **Collection System**

The Burlington Main WWTF collection system was not inspected as part of this CEI. I met with Steve Roy, P.E. with Burlington Public Works to discuss the combined sewer overflow (CSO) that was discovered in the Spring of 2014 near the intersection of Pine Street and Lakeside Avenue. The CSO was eliminated (by plugging) in April 2014. Plugging the CSO raises concerns about upstream overflows. We discussed the City's efforts to reduce storm-related flows in this portion of the collection system primarily by attenuating the flow from the Englesby wastewater storage system. The City installed pressure dataloggers in the manhole immediately upstream from the

CSO and in an adjacent sewer pipe to monitor wastewater elevations and potential overflows, and to provide data that will help develop strategies to prevent overflows.

### Summary and Recommendations

The overall inspection rating for the Burlington Main WWTF for the period May 1, 2014 to April 30, 2015 is "Excellent", the highest rating in our five tier rating system. During this period there was one minor permit violation for *E. coli*. Since Discharge Permit #3-1331 requires *E. coli* be monitored weekly, the percentage of violations is very low. It is evident that Tim, the other operators, and Department of Public Works staff are dedicated and do a great job operating the WWTF and deserve the "Excellent" rating.

The following actions or steps **must** be completed or implemented:

- The thermometers in the refrigerated portion of the influent and effluent composite samplers need to be calibrated against a NIST-Traceable thermometer at least once per year. The temperature inside the refrigerated portion at the start and end of collecting composite samples needs to be recorded.

The following is **recommended**:

- A procedure to carefully check the values entered into the WR-43 prior to submittal should be implemented.

If you have any questions regarding this inspection report, please feel free to contact me at (802) 490-6185 or [jeff.fehrs@state.vt.us](mailto:jeff.fehrs@state.vt.us).

Sincerely,



Jeffrey E. Fehrs, P.E.  
Environmental Engineer  
Operations and Management Section

Enclosures: EPA Water Compliance Inspection Report  
Discharge Permit #3-1331 Fact Sheet Pages 2 and 3  
Sheet titled "Main WWTP Scenario 2 - CSO Flows (13 to 88 MGD)"

Cc: Tim Glover, Chief Operator, Burlington Main Wastewater Treatment Facility (electronic copy)  
Steve Roy, P.E., Burlington Department of Public Works (electronic copy)  
Andrew Spejewski, Environmental Engineer, U.S. EPA Region 1 (electronic copy)  
Ernie Kelley, Program Manager, Wastewater Management Programs, VT DEC (electronic copy)  
Burlington Main Wastewater Treatment Facility Compliance File



United States Environmental Protection Agency

Washington, D.C. 20460

## Water Compliance Inspection Report

## Section A: National Data System Coding (i.e., PCS)

Transaction Code	NDPES	yy/mm/dd	Inspection Type	Inspector	Fac Type
1 N	2	3 VT0100153	11 12 15/06/09	17 18 C	19 S 20 1
Inspection Type Description					
Remarks					
21					
66					
Inspection Work Days					
Facility Self-Monitoring Evaluation Rating					
B1					
QA					
Reserved					
67					
69					
70 5					
71 N					
72 N					
73					
74 75					
80					

## Section B: Facility Data

Name and Location of Facility Inspected (For industrial users discharging to POTW, also include POTW name and NPDES permit number)	Entry Time/Date	Permit Effective Date
City of Burlington Main WWTF 53 LaValley Lane Burlington, Vermont	8:50 am 6/9/2015	July 1, 2005
	Exit Time/Date	Permit Expiration Date
	2:15 pm 6/9/2015	June 30, 2010 (a)
Name(s) of On-Site Representative(s)/Title(s)/Phone and Fax Number(s)	Other Facility Data	
Mr. Tim Glover, Chief Operator, Phone: (802) 862-6565		
Name, Address of responsible Official/Title/Phone and Fax Number.		
Ms. Laurie Adams, Assistant Director - Water Quality Phone: (802) 655-6421		
City of Burlington, Dept. of Public Works		
P.O. Box 878, Burlington, VT 05402-0878		
Contacted		
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

<input checked="" type="checkbox"/> Permit	<input checked="" type="checkbox"/> Self-Monitoring Program	<input type="checkbox"/> Pretreatment	<input type="checkbox"/> MS4
<input checked="" type="checkbox"/> Records/Reports	<input type="checkbox"/> Compliance Schedules	<input type="checkbox"/> Pollution Prevention	
<input checked="" type="checkbox"/> Facility Site Review	<input type="checkbox"/> Laboratory	<input type="checkbox"/> Storm Water	
<input checked="" type="checkbox"/> Effluent/Receiving Waters	<input checked="" type="checkbox"/> Operations & Maintenance	<input checked="" type="checkbox"/> Combined Sewer Overflow	
<input type="checkbox"/> Flow Measurement	<input type="checkbox"/> Sludge Handling/Disposal	<input type="checkbox"/> Sanitary Sewer Overflow	

## Section D: Summary of Findings/Comments (Attach additional sheets of narrative and checklists as necessary)

SEV Codes	SEV Description

Please refer to the attached letter dated July 8, 2015

(a) A complete permit renewal application was received prior to the application deadline. The current Discharge Permit remains in effect until the renewed Discharge Permit is issued.

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Phone and Fax Numbers	Date
Jeffrey E. Fehrs, P.E.	VT ANR/DEC/Watershed Mgmt. Div./O&M Sect. Phone: (802) 490-6185 Fax: (802) 828-1544	7/8/2015
Signature of Management QA Reviewer	Agency/Office/Phone and Fax Numbers	Date

## II. Description of Discharge

A quantitative description of the discharge in terms of significant effluent parameters is based on state and federal laws and regulations, the discharge permit application, and the recent self-monitoring data.

## III. Limitations and Conditions

The effluent limitations of the permit, the monitoring requirements, and any implementation schedule (if required), may be found on the following pages of the permit:

Effluent Limitations:	Pages 2 and 3 of 21
Monitoring Requirements:	Pages 6 through 9 of 21

## IV. Permit Basis and Explanation of Effluent Limitation Derivation

### **Secondary Treatment Process:**

The secondary treatment process is the portion of the facility that continuously processes all the sanitary wastewater flows under normal dry weather conditions, and a portion of the combined sewer overflows during storm events and snowmelt periods. The treatment facility has a design and permitted average daily flow of 5.3 mgd. Under wet weather conditions, the facility is designed to provide a secondary level of treatment with phosphorus removal for a flow rate up to 13 mgd, including 11 mgd influent and two mgd of concentrated underflow from the combined sewer overflow treatment system.

### **Combined Sewer Overflow (CSO) Treatment Process:**

The CSO treatment process consists of mechanical screening, vortex separation for solids removal and disinfection using a chlorine activated bromine disinfection process. The CSO treatment process is designed to operate in conjunction with the secondary treatment process in that the secondary treatment process is designed to treat the initial peak flows generated by wet weather events as well as the concentrated underflow waste stream from the vortex separator.

While the secondary treatment process is designed for an average daily flow of 5.3 mgd under dry weather conditions, the secondary treatment process has the hydraulic capacity to treat a total peak flow rate of 13 mgd of combined dry and wet weather wastewaters during storm events (where peak flow rate is an instantaneous rate of flow and is not to be confused with a total volume of water).

Wet weather instantaneous flows greater than 11 mgd up to 86 mgd receive treatment and disinfection by the combined sewer overflow treatment facility. The vortex separation process, combined with the hydraulic capacity of the secondary treatment plan, is designed to provide a relatively high level of treatment for all of the "first flush" flows generated during the early, rising flow stages of storm events. The "first flush" contains the highest pollutant concentrations found during typical storms. Disinfection chemicals are added to the CSO flow immediately before and after the vortex separator.

Approximately 2 mgd of highly concentrated underflow from the vortex separator is diverted to the secondary treatment process. Typically, a storm's instantaneous flow rate above the 75 mgd CSO system treatment capacity bypasses the vortex separator and is treated with screening and is mixed with the disinfected discharge from the vortex separator. This bypass is controlled by gate #1 and gate #2, which open when the water level exceeds a preset level that corresponds to an instantaneous flow rate of 75 mgd. According to the self-monitoring reports for the period 2001 through 2004, the CSO system was activated an average of 28 times per year; 13 times on average during the 'beach season' of June through August. Storm flows bypassed the vortex separator (gate #1 and/or gate #2 opened) an average of 6 times per year. Storm flow bypasses ranged from 1 minute to 116 minutes. During the entire four year period the total amount of time that one or both gates were open was 13 hours.

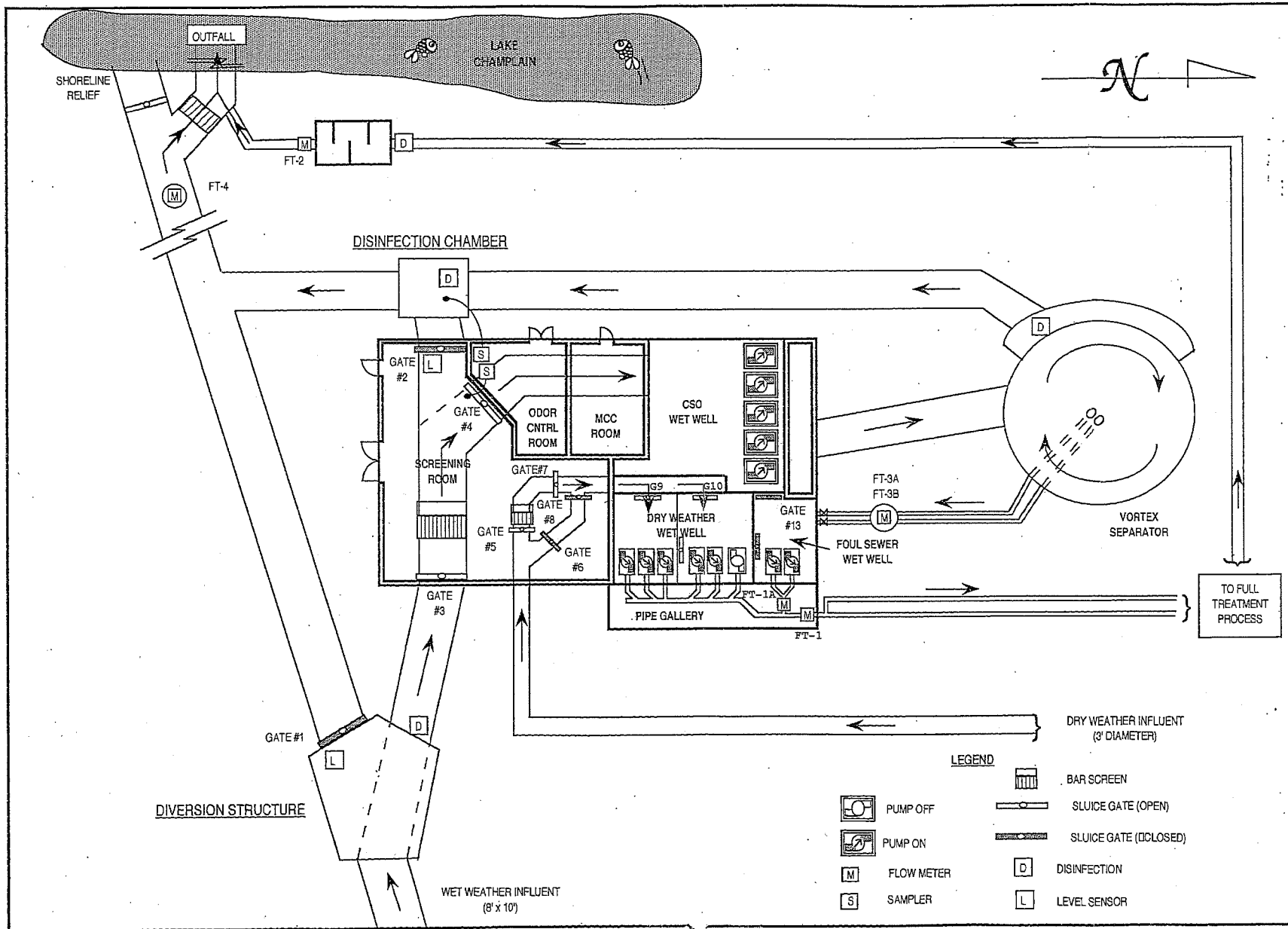
The proposed permit contains changes to effluent limits and conditions regulating the discharge from the CSO treatment process. The previous permit contained numerical water quality based effluent limits applicable to peak wet weather flows up to 75 mgd and best management practices (BMPs) designed to minimize impacts of the CSO discharge above 75 mgd. Due to changes in the Vermont Water Quality Standards the Department is now proposing to apply the numeric water quality based effluent limits to all discharges from the CSO treatment process including those in excess of 75 mgd. As a result of this proposed change the Department is also proposing to eliminate the majority of BMP conditions (Section I.A.7. of the previous permit) applicable to discharge S/N 002.

**Outfall:**

All flow components are discharged via a common outfall line terminating offshore in Burlington Bay. The outfall line is 10 feet in diameter and approximately 2400 feet in length including a 995 foot diffuser section at the end. The diffuser section through which effluent exits the outfall is located in an area southwest of the Burlington Harbor breakwater and is designated as a waste management zone. This waste management zone provides a mixing zone within a 200 foot radius around the diffuser, or an area 400 feet wide by 1400 feet long.

The outfall line has a hydraulic capacity of 227 mgd (equivalent to the peak flow of a ten-year storm) when the lake level is at the one-year frequency high elevation of 98.5 feet. The outfall capacity is reduced at higher lake elevations, but even at the ten-year extreme high level of 101.0 feet, the outfall will have capacity for the 115 mgd peak flow of a one-year storm. If the outfall capacity is exceeded, in order to prevent damage to equipment and infrastructure, the excess flow will be discharged through an emergency shoreline relief structure.

An offshore location, rather than the existing near-shore discharge site, was chosen to accommodate a long diffuser which takes advantage of greater effluent dilution opportunities available outside the breakwater. Lake modeling studies showed that larger scale lake current systems in the offshore areas provide much greater dilution within shorter distances from the outfall, compared with alternate discharge locations near the shore. In addition the longer outfall provides the disinfection contact time necessary for



**BURLINGTON  
PUBLIC WORKS**  
 P.O. BOX 849  
 BURLINGTON, VT  
 (802) 863-9094

**Main WWT Plant**

**Scenario 2 - CSO Flows**

**(13 to 88 MGD)**

DESIGNED BY: HTA  
 DRAWN BY: LSZ  
 PROJECT: Main WWT Plant

SCALE: 1" = 50'  
 DATE: 9/9/94

**Fig. 2**